

Environmental Assessment

Au Sable Light Station Cultural Landscape Rehabilitation



Au Sable Light Station - 1944



Pictured Rocks National Lakeshore June 2004

Submitted by: _____
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Superintendent Date

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CHAPTER 1 – PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

This Environmental Assessment (EA) evaluates potential environmental impacts of rehabilitating the cultural landscape at the Au Sable Light Station within Pictured Rocks National Lakeshore. This EA also evaluates potential impacts of enhancing the site to facilitate seasonal interpretation. In addition, this EA evaluates effects of uncontrolled non-native vegetation at the light station. The National Park Service (NPS) has prepared this EA in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality (CEQ) regulations of 1978.

The objective of the alternatives presented in this EA is to preserve the natural environment while rehabilitating the cultural landscape and enhancing infrastructure to support the interpretive program at Pictured Rocks National Lakeshore.

1.2 Background

Pictured Rocks National Lakeshore preserves over 70,000 acres of natural and cultural diversity. Stretching 42 miles along Lake Superior's south shore, it includes towering sandstone cliffs and brilliant beaches, upland hardwood forests and secluded wetlands. Stories from the park's past include life savers and lumberjacks, lighthouse keepers and blast furnace colliers. Open year round, visitors enjoy hunting, fishing, sightseeing, skiing, birding, hiking, and relaxing.

Pictured Rocks National Lakeshore preserves and interprets the history of three maritime organizations, the U.S. Lighthouse Service, U.S. Life Saving Service, and the U.S. Coast Guard. These activities are represented by historic sites at five locations within the park, at the Grand Marais Lifeboat Station, Grand Marais Harbor of Refuge, Au Sable Light Station, the Munising Range Light, and Munising Lifeboat Station on Sand Point. Facilities date from 1874 at Au Sable through 1960-1975 Coast Guard and include contemporary U.S. Coast Guard maintained aids to navigation.

Since 1988, the Lakeshore has undertaken several significant projects at Au Sable including the restoration of the interior and exterior of the assistant keepers quarters, the light tower, fog signal building, and several out buildings. This work was directed at exhibiting or suggesting an appearance of the 1910 era. Though many changes have occurred at the site and to the buildings since that time, the early 1900's were selected as a "theme" of restoration efforts to date. This action follows recommendations in the Historic Structure and Cultural Landscape Reports. Landscape rehabilitation is a continuation of long-term improvement of the overall site providing visitors with a "window into the past." The Cultural Landscape Report states on page 119:

The existing cultural landscape represents an evolved and layered industrial landscape that includes the period 1909-1910 as well as many other periods that are also significant to the history of the station. The concept of change is central to the story of the Au Sable light station. Re-creation of the cultural landscape of 1909-1910 would require a cultural landscape manipulation that is based on conjecture and that will

create a false and static sense of history. The site lends itself instead to an overall period of interpretation that tells the complete story of the station from beginning to end, including the period 1909-1910. The existing buildings, structures, and other site features already represent the different periods in which they were built and/or altered. Features that are absent can be interpreted without re-creating them on site.

Visitor use is concentrated in spring, summer, and fall, varying from year to year, but in general continues to increase by a small percentage each year. The light station is a very popular day use attraction in the park and is for many a destination. The station is adjacent to the North Country National Scenic Trail, which runs through the historic reservation. Some 10,000 visitors annually camp overnight along the trail at 13 backcountry campgrounds though only a portion of those visitors hike the entire Lakeshore segment of the North Country Trail. A backcountry campsite (Au Sable Point East) is located less than a mile east of the station. Approximately 550 people stay overnight at Au Sable Point East annually.

Wayside exhibits and park ranger guided tours of the station are geared to increasing visitor understanding and appreciation of the role, function, and day-to-day operation of lighthouses. Verbal and photographic historical vignettes are used during the guided tours to give visitors a sense of the changes that have occurred at the station through its history. An accurately depicted cultural landscape is an important part of this interpretive and educational effort as the landscape played a role in the successful operation of the station, e.g. reducing forest and structural fire hazards and assuring visibility of the light from the lake.

Work completed to date on the single keepers quarters HS-09 (historic structure 9) will facilitate adaptive use the first floor into a small ranger contact station and interpretive museum beginning in 2005. The museum will include several exhibits interpreting the Lighthouse Service, Au Sable, and Lake Superior shipping. The second floor of HS-09 is being adaptively used for seasonal staff or volunteer housing to help extend the visitor use season at the lighthouse. These projects are in concert with the National Park Service Management Policies (2001) (5.3.5.2) state that:

“The treatment of a cultural landscape will preserve significant physical attributes, biotic systems, and uses when those uses contribute to historical significance. Treatment decisions will be based on a cultural landscape’s historical significance over time, existing conditions, and use. Treatment decisions will consider both the natural and built characteristics and features of a landscape, the dynamics inherent in natural processes and continued use, and the concerns of traditionally associated people.

The treatment implemented will be based on sound preservation practices to enable long-term preservation of a resource’s historic features, qualities, and materials. There are three types of treatment for extant cultural landscapes: preservation, rehabilitation, and restoration. This project seeks to rehabilitate a cultural landscape. A cultural landscape may be rehabilitated for contemporary use if (1) it cannot adequately serve an appropriate use in its present condition, and (2) rehabilitation will retain its essential features, and will not alter its integrity and character or conflict with approved park management objectives.” (Pg. 56)

History of the Au Sable Light Station

Due to increased shipping on Lake Superior and the lack of lighthouses for over 90 miles of shoreline, in 1872 Congress appropriated \$40,000 for a lighthouse at Au Sable. The State of Michigan sold 326 acres of land to the federal government for the light station at a cost of \$407. Work began the following year and continued into 1874. In late July 1874, the Light House Board released a *Notice to Mariners* announcing, “*Notice is hereby given that on or about the night of Wednesday the 19th day of August 1874 a fixed white light will be exhibited from the new brick tower at Big Sable Point...*”

The Au Sable Light Station possesses a landscape that is a significant representation of a late-nineteenth and early twentieth-century Great Lakes light station. Layout of the Au Sable Light Station followed a utilitarian design based on organizational mandates of the time. Major buildings were connected by a network of sidewalks, linking not only the structures but also the duties and lives of the keepers.

The fog signal building was constructed in 1895. The first major improvement at the station was in 1897 when the hand-cranked fog signal was replaced by a steam-powered fog signal. This required construction of a new crib and seawall, a signal building, and pipes to carry lake water to operate the signal. The first signal did not work, however, and it was another year before a replacement was obtained and put in operation. This ended the duty of the lighthouse keeper to start cranking when the fog rolled in.

Until a road was built from Hurricane River in 1938-39, Lake Superior was the easiest way to access the Au Sable station. Docks existed at the station from first construction, but due to the battering of waves and ice they were constantly being repaired and improved. A tramway was installed in 1899, allowing supplies to be more easily moved between the dock and fog signal building.

Extensive alterations and additions were made to the light station in 1909, hence the origin of the site’s interpretive focus. Among these changes were additions to the quarters attached to the tower and new quarters for the principal keeper built just west of the tower. The attached dwelling was originally designed for just one keeper, but had been converted to a “double” with the appointment of an assistant keeper the year after the station began operation. The isolation and workload of the station was too much for one man. A third keeper, the second assistant, was assigned to Au Sable to do the additional work of keeping the steam-powered fog signal.

Over time, other improvements were made at the station. A new metal oil house was erected in 1915 with walkways, wells, woodsheds, and a garage in 1954. In 1930, a radio was placed at the station, and in 1935, a telephone line was installed connecting the keepers to the outside world. By the 1930’s, the quarters were modernized and the keepers and their families enjoyed central heat, gas cooking, electric light, and indoor plumbing.

For Au Sable, the fateful day marking its end came July 30, 1957, at a meeting in the Coast Guard’s Ninth District Headquarters in Cleveland where the announcement was made that the light would be automated. On July 6, 1961, the lighthouse land was declared excess property by

the U.S. Coast Guard to the General Services Administration. In 1968, GSA transferred the land to the Department of the Interior, National Park Service, for inclusion in the Pictured Rocks National Lakeshore. In 1972, the site was placed on the National Register of Historic Places.

Restoration efforts at the station began in earnest in 1988 with initial historic investigations of the double keeper's quarters and light tower. These activities included paint and plaster analysis, researching historic room sizes and uses, and shingle detail. Projects included fabrication and installation of missing interior wood trim, restoring the walnut balustrade and repairing the plaster walls and ceilings.

Since 1988, several structures have been painted, both inside and out. Doors, windows and screens have been restored, and the front porch on the double keeper's quarters was reconstructed to the 1909-1910 period. In 1988, an Historic American Buildings Survey crew measured the buildings that led to detailed structural drawings.

During the summer of 1992, the light tower lens room exterior was painted the historic black color and the lens room interior was restored. In 1993, the interior of the tower was painted and work was completed in the lens room. In 1994, replica linen curtains were hung in the lens room. In 1996, a replica chimney cone was installed in the lens room and the original Fresnel lens was returned to Au Sable.

A more detailed overview of light station history is found in Appendix A.

1.3 Purpose and Need

The Au Sable Light Station is the Lakeshore's premier cultural visitor attraction. The station is located near several front and backcountry visitor facilities. During July and August, some 5,000 people tour the assistant keepers building and the light tower with National Park Service and volunteer guides.

The Lakeshore will follow the guidance on cultural landscapes found in National Park Service Guideline 28, which state:

1. Plans should reflect respect for a landscape's period of historical significance and the features, patterns, and relationships contributing to its significance. (Chapter 3, Page 36)
2. According to federal law and the National Park Service Management Policies, all cultural landscapes are to be managed as cultural resources, regardless of the type of level of significance. Cultural landscape management focuses on preserving a landscape's physical attributes, biotic systems, and use when that use contributes to its historical significance. (Chapter 7, page 87)
3. A cultural landscape report (CLR) is the primary guide to treatment and use of a cultural landscape. Based on the historic context provided in a historic resource study, a CLR documents the characteristics, features, materials, and qualities that make a landscape eligible for the National Register. It makes recommendations for treatment consistent with the landscape's significance, condition, and planned use. (Chapter 7, page 91)

Recommendations in the Au Sable Light Station Cultural Landscape Report (1999, pps. 131-141) suggest numerous landscape treatments. Actions proposed in this EA include:

From page 135:

- Retain the existing pedestrian character of the station.
- Retain the existing appearance and proportions of the existing internal walk system.
- Continue the use of concrete walks; do not re-create boardwalks.
- Repair existing walks where possible; replace them in-kind where it is not.
- Reconstruct missing walks, especially within the waterfront/industrial cluster, and in conjunction with any reconstructions, such as the keeper's woodshed.

From page 136:

- Foster a sparse approach to the landscape that emphasizes its utilitarian character and quasi-military heritage. Acknowledge that tall trees were removed and discouraged in an arc-like zone between the tower and the lake, and that the area south of the tower was kept as an open, cleared area, free of most trees. Strive to approximate this appearance to the greatest degree practical today.
- Adjacent to and between the two building clusters, retain the existing mix of coastal grasses and low herbaceous plant materials. Keep this area mowed periodically to keep the groundcover low, but do not strive for a manicured lawn-like appearance that would be inconsistent with the appearance of this area during the period of significance. Strive for a well-maintained appearance consistent with that of the historic period.
- Keep areas adjacent to walks trimmed as they were during the historic period.
- Avoid the use of mechanical weed-eating equipment that can damage historic materials and finishes near contributing features, including concrete walks.
- Retain existing vestiges of ornamental and fruit-bearing species, such as lilac, wild rose, and apple; consider replacing them in-kind as existing species become damaged or diseased, but do not consider replacement essential; no preservation of genetic plant material is necessary.
- Re-establish the historic cleared area south of the station by removing second-growth trees and shrubs while retaining naturally occurring groundcover. Strive for the appearance depicted in Figures 10 and 23. Avoid mowing because it will destroy the low herbaceous plant materials that are desirable to reestablish the appearance of this area during the period of significance.
- Remove felled limbs and branches in the cleared area, the building clusters, and along roads, trails, paths, and walks.

This project stems from the park's interest in implementing these recommendations, which will enhance visitor experience by presenting a more accurate historic scene in relation to and surrounding the historic buildings.

Since transfer of ownership to the NPS, the landscape has continued to fill in with shrubs and trees. Without management of the landscape, this natural successional process will continue, concealing buildings, impeding visitor traffic, and leaving a historically inaccurate presentation

of the station. This group of projects will retard succession and enhance the historic scene for several years to come. Periodic management through mowing grassy areas once or twice a year will maintain the historic landscape, once converted to open, historically accurate area.

As funds and staffing permit, other features of the cultural landscape will be rehabilitated. Project Management Information System (PMIS) budget planning statements have been completed which call for reconstruction of the seawall, rehabilitation of HS-09 and fog signal building interiors, interior refurbishing exhibits in HS-11 (historic structure 11), and possible reconstruction of the boat dock. Future reconstruction of the two woodsheds is being considered and may be justified if sufficient construction plans can be located through research. Current project plans include adaptively using the interior of HS-09 for a small visitor contact station, museum, and seasonal staff/volunteer housing. These actions are consistent with recommendations found in the Au Sable Historic Structure Report.

1.4 Decision to be made

The goal of the National Park Service in this decision process is to determine an alternative that will accomplish the objectives of restoring the cultural landscape. The purpose of the National Environmental Policy Act (NEPA) process is to disclose the likely impacts of the proposed action and alternatives to that action. These actions include:

- Remove woody vegetation.
- Level the site surface by cutting and filling sandy soil.
- Restore the sidewalks.
- Reorient visitor traffic.
- Plant native vegetation.
- Install a below-grade septic system for HS-09.
- Limit up and down slope (Lake Superior shoreline) access to approved locations.

CHAPTER 2 - DESCRIPTION OF ALTERNATIVES

This chapter discusses two alternatives, plus a No Action alternative, for restoring and enhancing infrastructure for interpretive programming at the Au Sable Light Station.

Alternative A - No Action

This alternative would be a continuation of the status quo resulting in no active landscape manipulation or management. The result would be that none of the recommendations in the approved 1999 Cultural Landscape Plan would be implemented. Visitors would see a landscape unrepresentative of the era of interpretation and significance (1874-1959) that reservation buildings have been restored to. This unrepresentative landscape reflects neglect on the part of the Lakeshore in terms of an accurate historic scene. Certain building restoration activities would continue, yet the landscape would not be in concert with their historic appearance. Visitor traffic on the North Country National Scenic Trail would remain within the overall project area yet outside of historic sidewalk and circulation patterns resulting in continued use and growth of numerous social trails.

Under this alternative, most natural processes would be allowed to continue. This would result in an increase of woody vegetation and the loss of a grassy and low herbaceous ground cover. Human use of the sand wind-blown terrain would further destabilize portions of the beach ridge Lake Superior shoreline landscape. Exotic vegetation, particularly spotted knapweed, would continue to expand its control of the site and eventually displace additional native vegetation.

Alternative B - Selective Cultural Landscape Rehabilitation (Environmentally Preferred Alternative)

This alternative would allow visitors to experience a landscape somewhat representative of the period of significance of 1874-1958. The alternative will be characterized by the following actions as recommended in the approved Cultural Landscape Plan of 1999:

- Remove trees that are 6-inches in diameter at base height (dbh) or greater within the historically cleared landscape area (excluding the Lake Superior shoreline beach ridge bank to the north of the station).
- Areas of landscape blowout (wind deflated sandy depressions) exposing structural, archeological resources, or erosion control elements would be filled or covered with sand/soil mix. This would include approximately 5,625 square feet of area adjacent to the fog signal building and cistern and 1,875 square feet adjacent to HS-11 (historic structure 11), including remnants of the former brick patio.
- An 1,875 square foot area of sand blowout northwest of HS-10 (historic structure 10) and HS-11 (historic structure 11) will be filled with adjacent beach sand material to repair visitor-induced erosion.
- Approximately 18,625 square feet of disturbed or bare sandy soils repaired at former beach ridge blowouts will be revegetated with seeds from local, native vegetation suitable for xeric (dry) sites. Seed would be spread both in the fall of the project year and the following spring.

- Sand blowout (wind deflated sandy depressions) within this cultural landscape resulted from human recreational activities that include climbing the lakeshore dune face to gain access to the lighthouse. These blowouts will be restored using dispersed sand/soil mix originating from these blowouts that presently occur within the cultural landscape.
- Exotic plants will be mechanically removed from the light station grounds and surrounding landscape, encompassing approximately 2.5 acres. The work can be accomplished by hand pulling from the sandy soil. The area will be seeded with local, native xeric (dry) species suitable to the site in both the fall of the project year and the following spring. Exotic plants will be monitored and controlled annually.
- No sidewalks would be rehabbed in this alternative.

Alternative C - Full Cultural Landscape Rehabilitation (Preferred Alternative)

This alternative would allow visitors to experience a landscape representative of the period of significance 1874-1958. The alternative will be characterized by the following actions as recommended in the approved Cultural Landscape Plan of 1999:

- Remove all woody vegetation within the historically cleared landscape area (excluding the Lake Superior shoreline beach ridge bank face).
- Approximately 10,125 square feet of landscape blowout (wind deflated sandy depressions) including exposed structural, archeological resources, or erosion control elements would be filled or covered with sand/soil mix as indicated by historic photographs. Areas include (1) northwest of HS-09, (2) entrance to service road near garage, (3) North Country Trail corridor through the reservation, and (4) approach to Fog Signal building from lake. Fill for these areas will be obtained from high windblown beach ridge areas adjacent to the low areas. Landscape prescriptions will approximate scene in historic photographs.
- Approximately 18,625 square feet of disturbed or bare sandy soils repaired at former beach ridge blowouts will be revegetated with seeds from local, native vegetation suitable for xeric (dry) sites. Seed would be spread mechanically both in the fall of the project year and the following spring.
- Sand blowouts (wind deflated sandy depressions) within this cultural landscape resulted from human recreational activities including climbing the lakeshore dune face to gain access to the lighthouse. These blowouts will be restored using dispersed sand/soil mix originating from these blowouts that presently occur within the cultural landscape.
- Exotic plants will be mechanically removed from the light station grounds and surrounding landscape, encompassing approximately 2.5 acres. The work can be accomplished through hand pulling from the sandy soil. The area will be seeded with local, native xeric (dry) species suitable to the site in both the fall of the project year and the following spring. Exotic plants will be monitored and controlled annually.
- Reconstruct approximately 75 feet of missing historical sidewalks. Level approximately 250 feet (80 percent) of remaining buckled sidewalks to reduce safety hazards. Visitor traffic on the North Country Trail would remain within the overall project area yet be relocated approximately 30 feet north to the historic sidewalk and circulation patterns.

Environmentally Preferred Alternative (Alternative B)

The environmentally preferable alternative is defined as "the alternative or alternatives that will promote the national environmental policy as expressed in Section 101 of the National Environmental Policy Act. Ordinarily, this means the alternative that causes least damage to the biological and physical environment; it also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources." ("Forty Most Asked Questions Concerning Council on Environmental Quality's National Environmental Policy Act Regulations," 1981)

All listed alternatives within this EA have some inherent benefits to natural resources with respect to natural succession of vegetation and/or landscape restoration. The environmentally preferred alternative represents a balance of maintaining cultural and natural resources integrity. We propose that Alternative B would be the environmentally preferred alternative for the following reasons:

1. Restore blowouts (wind deflated sandy depressions) along crest of shoreline beach ridge resulting from human use.
2. Remove existing exotic vegetation (e.g., spotted knapweed).
3. Visitor traffic on the North Country Trail would remain within the overall project area yet be relocated to historic sidewalk and circulation patterns, thus reducing numerous social trails.
4. Revegetate restored blowouts (wind deflated sandy depression) and adjacent areas with local, native seed stock.
5. Maintain most of the character of the cultural landscape.
6. Allow some facilities (e.g., small septic field) to enhance ability of lakeshore staff to provide interpretive programs of the cultural landscape.
7. Require less removal of woody vegetation at the site.
8. Allow natural succession of woody vegetation to occur on a portion of the cultural landscape.

This alternative would restore blowouts (wind deflated sandy depressions) that have occurred within the shore line beach ridge from human impacts, eliminate negligible effects on water resources, restore native vegetation, and maximize the potential for natural vegetative succession to occur. Performing these actions will fulfill NPS mandates by restoring the integrity of cultural and natural resources within the lakeshore. It will also fulfill mandates related to enhancing visitor experience and knowledge of the resources contained within Pictured Rocks.

Actions Common to All Alternatives

In all alternatives, the septic field will be constructed south of and adjacent to HS-09, the main keepers quarters. This portion of the project is to support expanded on-site staff presence and housing. Volunteers or seasonal staff housed in HS-09 will require modern sanitary facilities regardless of any cultural landscape project plans.

An 1875 square foot area of soil will be disturbed by installation of a below grade septic drain field south of HS-09, the main keepers quarters. Construction of the field will entail excavating a trench for the single outflow septic line from HS-09 to the septic tank, an excavated hole for

the septic tank (8 feet deep by 6 feet wide by 8 feet long), and trenches for the septic drain field. The drain field footprint will be minimized by using a non-gravel construction with “infiltrators” instead of conventional perforated pipe in gravel.

A permit to construct the septic leach system has been applied for and approved by the county health office who assures that the design complies with the Michigan Groundwater Quality Control (Part 127 – ACT 368 P.A. 1978 as amended, and Safe Drinking Water Act 399 P.A. 1976 and administrative rules. See attached Conditions of Permit and Standard Requirements.

- The system is designed to accommodate 300 gpd and utilizes two 1000-gallon septic tanks connected in series to the leach field that has an absorption area of 400 square feet.
- The field is located more than 200 feet from the Lake Superior shoreline.
- The site is located 30 inches above the lake with 30 feet of sand to bedrock.
- The water well, which is cased to bedrock, is 270 feet deep and is located 90 feet from the septic system.
- Underground storage tanks that were removed by the U.S. Coast Guard in the 1980's, of which no leaks or contamination was found, were located 200 feet east of the proposed septic system and 300 feet from the water well.
- Conventional tracked excavator will perform construction, and equipment transported on the light station access road. The proposed system is located 25 feet from the end of the access road turn-around.
- Sandy soil is consistent throughout with sparse vegetation and any damage to vegetation adjacent to the site from equipment and activity will be minimal and nearly unnoticeable.

CHAPTER 3 – AFFECTED ENVIRONMENT

3.1 Natural Resources

Air Quality

Air quality in and around Pictured Rocks National Lakeshore is good. Air pollution in general is a growing concern but has not yet been demonstrated at the Lakeshore. Reductions in visibility are primarily a consequence of fog generated by climatic changes over Lake Superior and adjacent lands.

Groundwater Hydrology

The most accessible sources of groundwater over a large part of Alger County are the deposits of glacial drift. These range from clayey till and lake deposits of low permeability to highly permeable sand and gravel outwash. The most extensive outwash in the national lakeshore is the Kingston Outwash Plains. The thickness of the outwash deposits of the Kingston Plains probably exceeds 30 meters (100 feet). Some small wells in the area are yielding in the range of 20 gallons per minute (gpm).

Beds of sand that were deposited in glacial lakes also are a source of water for wells. Glacial lake deposits in the lakeshore occur in a strip along the shore of Lake Superior. Most of the wells tapping the lake deposits are shallow-driven and commonly provide a satisfactory and inexpensive water supply. Ten to twenty gpm can be obtained from properly constructed wells tapping sandy lake deposits, and, where outwash or beach-deposited sand and gravel are present, wells may yield 100 gpm.

The groundwater yielded by outwash and lake deposits, Munising sandstone, and Jacobsville sandstone meets federal primary safe water drinking standards; some of the groundwater contains noticeable amounts of iron. The groundwater from the outwash and lake deposits is soft to moderately hard, whereas Munising sandstone and Jacobsville sandstone water is moderately hard to hard.

Potential adverse effects of a well and small septic field could include interruptions of water flow and introduction of organic pollutants. The well serving the Au Sable station is 300 feet deep. The distance between the well and the proposed septic field follows state guidelines (Michigan Criteria for Subsurface Sewage Disposal, D-48 Rev 6/89 – Appendix 3). Following these guidelines would ameliorate potential negative effects. Because of groundwater flow and geology, no unique mitigative actions are anticipated.

Underground fuel tanks were removed from the area in 1988. The tanks were a considerable distance from the well that existed at the time of the U.S. Coast Guard station operation.

Vegetation

On coarse outwash and coastal sands (about 10 percent of the lakeshore), red pine (*Pinus resinosa*), white pine (*Pinus strobus*) and jack pine (*Pinus banksiana*) are dominant over story species with associated xeric (dry) groundcover. The soil at Au Sable Point is predominantly an excessively drained Shelldrake sand composed of a ridge-swale beach ridge complex. Early successional stands on these soils contain considerable amounts of paper birch (*Betula papyrifera*) and aspen (*Populus* spp.). Ground and crown fires influenced this pine-dominated vegetation prior to European settlement.

A suite of unusual vascular plant species occupies the nearby Grand Sable Dunes. Seven species listed as threatened or special concern by the State of Michigan are present. These include dune grass (*Elymus mollis*), stitchwort (*Stellaria longipes*), Lake Huron tansy (*Tanacetum huronense*), ram's head orchid (*Cypripedium arietinum*), Douglas' hawthorn (*Crataegus douglasii*), calypso orchid (*Calypso bulbosa*) and Pitcher's thistle (*Cirsium pitcheri*). Pitcher's thistle, a Great Lakes endemic, is listed as threatened by the U.S. Fish and Wildlife Service (USFWS). The dunes also contain a surprising variety of "moonwarts" (*Botrychium* subgenus *Botrychium*) and orchids. Inspection of the site found the no species listed as threatened or special concern on light station grounds, but close proximity to source populations and favorable habitat present the need for continual monitoring.

Threatening the integrity of vegetative communities at the light station and nearby dunes are exotic plant species. Spotted knapweed (*Centaurea maculosa*), red clover (*Trifolium pratense*), and white sweet clover (*Melilotus alba*) are well established. Spotted knapweed is the predominant plant species in open areas of the light station landscape. The disturbed nature of the cultural landscape, and significant visitor use, presents a challenge to exotic plant control and preventing introductions of other exotic plant species.

Wetlands

There are no surface waters or wetlands in the proposed project area.

Wildlife

Sign or sightings of gray wolf (*Canis lupus*), a federally listed species, are occasionally observed near the assessed area. No established packs are known to occupy the park area, but transient animals may occasionally occur in the general area, at least during snow-free seasons. No evidence of lynx (*Lynx canadensis*) has been noted in the entire lakeshore in recent years. Other more common mammals include black bear (*Ursus americanus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), bobcat (*Lynx rufus*), white-tailed deer (*Odocoileus virginianus*), mink (*Mustela vison*), muskrat (*Ondatra zibethicus*), skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), snowshoe hare (*Lepus americanus*), porcupine (*Erethizon dorsatum*) and eastern chipmunk (*Tamias striatus*).

A known bald eagle (*Haliaeetus leucocephalus*), a federally listed species, nest occurs about 0.5 miles from this cultural site. USFWS service staff were consulted (M. Decapita, pers. comm.) regarding potential effects. It was concluded that restoration activities would have a minimum,

short-term effect. Furthermore, restoration would occur outside the critical nesting period; we anticipate restoration efforts to begin in early September.

Other avian species found within the area include upland species such as ruffed grouse (Bonasa umbellus), spruce grouse (Dendragapus canadensis), sharp-tailed grouse (Tympanuchus phasianellus), and American woodcock (Scolopax minor); as well Charadriiformes (gulls and shorebirds). Several species of raptors are found within the park which include northern goshawk (Accipiter gentilis), northern harrier (Circus cyaneus), sharp-shinned hawk (Accipiter striatus), red-tailed hawk (Buteo jamaicensis), barred owl (Strix varia), and other hawk and owl species. Other common avian species include turkey vulture (Cathartes aura), several species of Orders Piciformes (woodpeckers) and Passeriformes (perching birds), including numerous warblers and other songbirds.

3.2 Cultural Resources

The Au Sable Light Station is one of two National Register sites within the Lakeshore. The Lakeshore's cultural resources are a mix of archeological remains, logging, maritime, and recreational sites and natural landmarks and ecology associated with Native American and Euro-American people of the past. All these integrate in a set of resources and views of those resources that have integrity and spatial organization and by law are to be conserved without impairment.

Documentation of cultural landscapes is required within the National Park Service in a nationwide database known as the Cultural Landscape Inventory (CLI). The CLI requires a designation of management treatments. In Section 4 of the CLI, the Au Sable buildings and landscape are formally designated in the management category "Must Be Preserved and Maintained." (Page 5 of 15, Part 4)

Section 106 (16 U.S.C. 470f) of the National Historic Preservation Act requires that, prior to the Federal approval of any project that will affect any property included in the National Register of Historic Places, the approving agency must consult with the Advisory Council on Historic Preservation about the proposed project and its effects. The accompanying regulations (36 CFR 800) require that the appropriate (i.e., Michigan State Historic Preservation Officer) advise and assist Federal agencies (i.e., Pictured Rocks National Lakeshore) in carrying out its Section 106 responsibilities. It further requires that Indian tribes "that attach ... religious and cultural importance" to the Register property be involved in the consultation process. Upon approval of this document by the National Park Service Midwest Regional Office, these entities will be provided this document for review and comment prior to commencement of the project.

A letter from the Michigan State Historic Preservation Officer has been received (October 1, 2002, re: ER 499.02) stating that in their opinion, the project will have **no adverse impacts** to the cultural resources.

3.3 Recreational Experience

The Au Sable Light Station and its environment are important recreational resources within the Lakeshore. Visitors hike and sea kayak to the lighthouse day use site and overnight backcountry hikers stay in a backcountry site just east of the light station. Beach combing, swimming, hiking, and overnight camping are popular activities during the spring, summer and fall. Limited cross-country skiing also occurs at the lighthouse in winter. A portion of the North Country National Scenic Trail runs the length of the park and bisects the Au Sable site.

3.4 Natural Sound

We define natural sound as sound produced by non-anthropogenic sources. Pictured Rocks National Lakeshore has degradation of natural sound due to vehicular traffic, tour boats, and other motorized vehicle use within and adjacent to the Lakeshore. Natural sound is affected most during the busy season (June-September). In addition, natural sound in Pictured Rocks National Lakeshore is affected by snowmobile use during December-March. Areas of land further from motorized vehicle use are affected less than are areas near motorized vehicle use.

3.5 Visual Resources

The Au Sable Light Station provides visitors with sweeping vistas of the Grand Sable Banks and Dunes, Lake Superior shoreline and horizon, and a nearby boreal forest. Distant views of the Grand Marais breakwater light and Indianhead Point (part of the Pictured Rocks cliffs) are visible many miles away. The vast Lake Superior inland seascape also dominates the scene.

3.6 Socioeconomic Issues

There are no known socioeconomic issues associated with this project.

3.7 Public Health and Safety

The project will reduce potential tripping hazards associated with missing and uneven sidewalk surfaces and sand-covered sidewalks. The project will also provide for modern restroom conveniences for on-site staff.

CHAPTER 4 - ENVIRONMENTAL CONSEQUENCES

This chapter presents the probable environmental effects, or consequences, of restoring the Au Sable Light Station within Pictured Rocks National Lakeshore. It also presents the scientific and analytic basis for the comparisons of the alternatives.

In accordance with the National Environmental Policy Act, evaluation of environmental effects requires consideration of the intensity, duration, and cumulative nature of effects, as well as a description of measures to mitigate for adverse effects. Effects are described as adverse or beneficial, and level of intensity for each resource topic described was determined. A determination as to potential impairment of resources is also required under National Park Service *Management Policies 2001*. *Management Policies* states that:

While Congress has given the Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement (enforceable by the federal courts) that the NPS must leave park resources and values unimpaired unless directly and specifically provided for by legislation or by the proclamation establishing the park.

The “park resources and values” that are subject to the no-impairment standard include:

The park’s scenery, natural and historic objects, and wildlife, and the processes and conditions that sustain them, including, to the extent present in the park: the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural soundscapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structures, and objects; museum collections; and native plants and animals;

Opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing any of them;

The park’s role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the American people by the national park system; and

Any additional attributes encompassed by the specific values and purposes for which it was established.

Intensity

The intensity of effects on natural and cultural resources was determined using the following definitions:

Negligible - the effect is localized and not detectable or at the lowest levels of detection.

Minor - the effect is localized and slightly detectable but would not affect overall structure of any natural community or is confined to a small area of a cultural resource.

Moderate - the effect is clearly detectable and could have an appreciable effect on individual species, communities, and/or natural processes, or is sufficient enough to cause a change in the character-defining features of a cultural resource.

Major - the effect is highly noticeable, and would have a substantial influence on natural resources, including effects on individuals or groups of species, communities, and/or natural processes; or results in a substantial and highly noticeable change in character-defining features of a cultural resource.

The intensity of effects on visitor experience and aesthetic resources was determined using the following definitions:

Negligible - the effect would not be detectable by visitors and would have no discernible effect on their experience.

Minor - the effect is slightly detectable by visitors but would not affect overall visitor use and/or visitor experience.

Moderate - the effect is clearly detectable by visitors and could have an appreciable effect on the visitor experience.

Major - the effect would have a substantial, highly noticeable influence on the visitor experience and could permanently alter access, use, and availability of various aspects of a visitor experience.

Duration

Duration refers to the time period over which the effects of an impact persist. For impact topics evaluated in this document, the duration of impacts across all categories were determined using the following definitions:

Short-term - the impact lasts less than three months (estimated duration of the project and window of construction activities at this location).

Long-term - the impact lasts three months or longer.

Cumulative - impacts that are “additive” to a particular environmental resource.

4.1 Natural Resources

Air Quality

If Alternative B or C (C is the preferred alternative) is accomplished, air quality would be adversely affected for a short period via dust put into the area due to alterations of the landscape via earth-moving equipment.

There are no cumulative impacts to air quality in Alternatives A, B, or C.

Conclusion: Alternative A (no action) would have no effect on air quality. Alternatives B and C (preferred alternative) would have minor short-term adverse effect on air quality.

There would be no impairment to air quality from Alternative A, B, or C.

Groundwater Hydrology

If Alternative B or C (C is the preferred alternative) are accomplished, groundwater hydrology would be subject to negligible or minor long-term adverse effects due to construction of a low volume septic field and/or well. As septic and well standards need to meet Michigan Department of Environmental Quality standards (Michigan Criteria for Subsurface Sewage Disposal, D-48 Rev 6/89), only negligible long-term adverse effects should occur.

A permit to construct the septic leach system has been applied for and approved by the county health office who assures that the design complies with the Michigan Groundwater Quality Control (Part 127 – ACT 368 P.A. 1978 as amended, and Safe Drinking Water Act 399 P.A. 1976 and administrative rules. See attached Conditions of Permit and Standard Requirements

- The system is designed to accommodate 300 gpd and utilizes two 1000-gallon septic tanks connected in series to the leach field that has an absorption area of 400 square feet.
- The field is located more than 200 feet from the lake Superior shoreline.
- The site is located 30 inches above the lake with 30 feet of sand to bedrock.
- The water well, which is cased to bedrock, is 270 feet deep is located 90 feet from the septic system.
- Underground storage tanks that were removed by the U.S. Coast Guard in the 1980's, of which no leaks or contamination was found, were located 200 feet east of the proposed septic system and 300 feet from the water well.
- Conventional tracked excavator will perform construction, and equipment transported on the light station access road. The proposed system is located 25 feet from the end of the access road turn-around.
- Sandy soil is consistent throughout with sparse vegetation and any damage to vegetation adjacent to the site from equipment and activity will be minimal and nearly unnoticeable.

There are no cumulative impacts to groundwater hydrology anticipated in Alternatives A, B, or C.

Conclusion: Alternative A (no action) would have no effect on groundwater quality. Alternatives B or C would have negligible or minor long-term adverse effects on groundwater hydrology.

There would be no impairment to groundwater hydrology from Alternative A, B, or C.

Vegetation

Alternative A (no action) would allow natural succession of woody vegetation to occur. In addition, Alternative A would allow continuation of non-native plant populations to persist. Alternative B and C would result in removal of some native naturally regenerating small trees and shrubs. Alternatives B and C would also result in removal of non-native vegetation species at the site. Removal of non-native vegetation will reduce its overall presence in the lakeshore and reduce potential for additional colonization.

Cumulative impacts to vegetation in Alternatives A will likely include continued growth of shrubby and woody vegetation and increased ground cover by exotic species such as spotted knapweed. Alternatives B, or C (C is the Preferred Alternative) will likely include reduction of woody species and an increase of herbaceous plant species including blueberries. Exotic species such as spotted knapweed are likely to decline in abundance.

Conclusion: Alternative A (no action) would have a minor long-term adverse effect on vegetation. Alternative B or C (C is the preferred alternative) would have a minor long-term positive effect on vegetation.

There would be no impairment of vegetation from Alternative A, B, or C.

Wildlife

Alternative A (no action) would have a minor long-term adverse effect on wildlife resulting from non-native plants altering habitat that would otherwise be occupied by native species. Alternatives B and C (C is the preferred alternative) would have minor long-term positive effects on wildlife. With respect to bald eagles, restoration would occur outside the critical nesting period and is anticipated to begin in early September.

There are no cumulative impacts to wildlife anticipated in Alternatives A, B, or C.

Conclusion: Alternative A (no action) will have a long-term negligible adverse effect on wildlife. Alternatives B and C (C is the preferred alternative) will have long-term negligible positive effects on wildlife. Although gray wolves and bald eagles are known to occur in the general area, no threatened or endangered wildlife has been documented at the Au Sable Light Station project area.

There would be no impairment to wildlife, including threatened or endangered species, from Alternative A, B, or C.

4.2 Cultural Resources

The Au Sable Light Station is one of two National Register sites within the Lakeshore. The Lakeshore's cultural resources are a mix of archeological remains, logging, maritime, and

recreational sites and natural landmarks and ecology associated with Native American and Euro-American people of the past. All these integrate in a set of resources and views of those resources that have integrity and spatial organization and by law are to be conserved without impairment.

Section 106 (16 U.S.C. 470f) of the National Historic Preservation Act requires that, prior to the Federal approval of any project that will affect any property included in the National Register of Historic Places, the approving agency must consult with the Advisory Council on Historic Preservation about the proposed project and its effects. The accompanying regulations (36 CFR 800) require that the appropriate (i.e., Michigan State Historic Preservation Officer) advise and assist Federal agencies (i.e., Pictured Rocks National Lakeshore) in carrying out its Section 106 responsibilities. It further requires that Indian tribes "that attach... religious and cultural importance" to the Registered property be involved in the consultation process. Upon approval of this document by the National Park Service Midwest Regional Office, these entities will be provided this document for review and comment.

Alternative A (no action) will have a major long-term negative impact on the cultural resources of the site. As vegetation continues to grow within the historically cleared area (for fire protection, site maintenance and other reasons), the historic scene will be increasingly impaired as an historically open area fills in with trees and shrubs. Remnants of the former brick patio will sustain major long-term negative impacts as they will remain visible creating tripping hazards and susceptible to looting disturbance by visitors.

Alternatives B and C (C is the preferred alternative) will have a moderate short-term impact on the cultural resources of the site in that the historic scene will be manipulated as it is being rehabilitated to its early 1900's appearance. Sidewalk reconstruction will result in moderate long-term impacts as they are leveled and realigned to provide for public safety. Remnants of the former brick patio will sustain major long-term positive impacts as they will be covered to reduce tripping hazards and looting disturbance by visitors.

Cumulative impacts to cultural resources in Alternative A include continued presence of a non-historic scene with woody and shrubby vegetation in the light station reservation area that would have been kept clear of vegetation by lighthouse keepers on a regular basis. Alternatives B, or C (C is the preferred alternative) will lead to a more historic appearance of the light station reservation as would have appeared when it was operational by the U.S. Lighthouse Service and the U.S. Coast Guard.

There would be no impairment of cultural resources from Alternative A, B, or C.

4.3 Recreational Experience

The Au Sable Light Station and its environment are important recreational resources within the Lakeshore. Visitors hike and sea kayak to the day use site and overnight backcountry hikers stay in a backcountry site just east of the light station. Beach combing, swimming, hiking, and overnight camping are popular activities during the spring, summer and fall. Limited cross-

country skiing also occurs at the lighthouse in winter. A portion of the North Country National Scenic Trail runs the length of the park and bisects the Au Sable site.

Alternatives B and C (C is the preferred alternative) would impact recreational experience during structural renovations and landscaping activities.

Cumulative impacts to recreational experience in Alternative A include continued presence (visual quality) of a non-historic scene with woody and shrubby vegetation in the light station reservation area that would have been kept clear of vegetation by lighthouse keepers on a regular basis. Alternatives B, or C (C is the preferred alternative) will lead to a more historic appearance of the light station reservation as would have appeared when it was operational by the U.S. Lighthouse Service and the U.S. Coast Guard. This will lead to a more accurate representation of the station and a resultant higher quality recreational experience.

Conclusion: Alternative A (no action) will have no effect on recreational experience. Alternatives B and C (C is the preferred alternative) will have moderate short-term adverse effects on recreational experience.

There would be no impairment of recreational experience from Alternative A, B, or C.

4.4 Natural Sound

Alternative B and C (C is the preferred alternative) would impact natural sound during structural renovations and landscaping activities. Sounds will not exceed a moderate level and will occur for relatively short (<several hours) periods throughout the project.

There are no cumulative impacts to natural sound anticipated in Alternatives A, B, or C.

Conclusion: Alternative A (no action) will have no effect on natural sound. Alternative B and C (C is the preferred alternative) will have moderate short-term adverse effects on natural sound.

There would be no impairment of natural sound from Alternative A, B, or C.

4.5 Visual Resources

The Au Sable Light Station provides visitors with sweeping vistas of the Grand Sable Banks and Dunes, Lake Superior shoreline and horizon, and a nearby boreal forest. Distant views of the Grand Marais breakwater light and Indianhead Point (part of the Pictured Rocks cliffs) are visible many miles away.

Conclusion: Alternative A (no action) will have no effect on visual resources. Alternative B and C (C is the preferred alternative) will have moderate short-term adverse effects on visual resources.

Cumulative impacts to recreational experience in Alternative A include continued presence (visual quality) of a non-historic scene with woody and shrubby vegetation in the light station

reservation area that would have been kept clear of vegetation by lighthouse keepers on a regular basis. Alternatives B, or C (C is the preferred alternative) will lead to a more historic appearance of the light station reservation as would have appeared when it was operational by the U.S. Lighthouse Service and the U.S. Coast Guard. This will lead to a more accurate representation of the station and a resultant higher quality recreational experience.

There would be no impairment of visible resources from Alternative A, B, or C.

4.6 Socioeconomic Issues

There are no known socioeconomic issues associated with this project.

4.7 Public Health and Safety

The project will reduce potential tripping hazards associated with missing and uneven sidewalk surfaces and sand-covered sidewalks.

Cumulative impacts to public health and safety anticipated in Alternatives A and B could result in increased visitor or staff accidents due to visitors tripping or falling on uneven, broken, or missing sidewalk surfaces. Cumulative impacts for Alternative C (which is the preferred alternative) may include a greatly reduced hazard of visitor and staff tripping or becoming injured due to uneven, broken, or missing sidewalk surfaces.

Conclusion: Alternative A (no action) will have a long-term moderate negative effect on public health and safety. Alternative B and C (C is the preferred alternative) will have moderate long-term positive effects on public health and safety.

There would be no impairment of public health and safety from Alternative A, B, or C.

CHAPTER 5 – LIST OF PREPARERS

5.1 Primary Preparers

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Appendix A

A Brief History of the Au Sable Light Station

In 1872, the U.S. Lighthouse Service acquired the Au Sable Point property adjacent to Lake Superior for development as a light station. The establishment and subsequent expansion of the station were in response to the growing importance of commercial navigation on Lake Superior. During the prehistoric period, Native Americans had burned woodland in the Au Sable vicinity and valued the Pictured Rocks as a place of special importance. By the early seventeenth century, French explorers, missionaries, and fur traders were present in the region. With Michigan statehood in 1837, the discovery of iron ore in Marquette County in 1844, and the completion of the Soo Locks in 1855, navigation on Lake Superior increased significantly. Consequently, the need to establish a light station to serve the Au Sable vicinity became more pressing.

The light tower and original dwelling developed soon after site acquisition, and the station was fully staffed and operational by 1874. Other early structures included a wharf and a brick oil house. A site of both industry and residence, the station represents the tangible evidence of a comprehensive federal effort to protect navigation on the Great Lakes through the nineteenth and twentieth centuries. The station at various times possessed a diverse assemblage of buildings and structures that have included the imposing tower as well as dwellings for keepers and other personnel, specialized structures such as seawalls, tramways and boatways, and utilitarian structures such as privies and dog kennels. Site development continued through the twentieth century with the station growing in response to its utilitarian needs.

Throughout its history, the station - known until 1910 as the Big Sable Light Station - was isolated and subject to the harsh weather conditions of the Lake Superior Upper Peninsula. Over time, a network of walks and paths developed to connect major site buildings with auxiliary structures and the lakefront. Considerable construction was undertaken to modernize the site between 1909 and 1938: boardwalks were replaced with concrete walks, a metal oil house was built, vehicular access was improved, the fog signal's dependence on steam was discontinued when the air diaphone system was installed, the dock was extended, a telephone line was installed, and a new keeper's dwelling was built. From 1939 to 1958 modernization of the station continued, with replacement of buildings and structures damaged in storms and changes necessary to accommodate residential life at the station.

By the late 1950's, the transition to an automated system was underway and many site features were removed or abandoned as their uses were continued. While the garage was built in 1954, the most significant site change came in 1958 as a result of the virtual abandonment of station operations when the transition to automation was completed. From 1959 to 1966 the abandoned site was neglected, and site features became deteriorated and damaged or were lost entirely. In 1968, the light station property was transferred from the U.S. Coast Guard (USCG), to the National Park Service and became part of the Pictured Rocks National Lakeshore.

For most of its history, the light station was managed in a quasi-military manner that resulted in a well-maintained but remote and isolated landscape. Yet throughout its existence, the Au Sable station site also has been subjected to the destructive effects of erosion and storms, and various

strategies have been implemented to protect the site from the natural forces of water, wind, and eroding sand. The lakefront, in particular, has been vulnerable, although the bluff also has eroded substantially. Lighthouse personnel were posted at the light station continuously from 1874 until 1958, although usually only seasonally. With the installation of an automatically operated light, however, regular staffing of the station was discontinued. The station has been in continuous federal ownership since 1872 although there have been administrative and operational changes as lifesaving and coastal security policies and operations have evolved.

1873–1895: Initial Development of the Light Station

The period 1873–1895 saw the initial site development of the light station. Major site development occurring during this period included construction of temporary quarters for workers and a wharf in 1873; completion of the lighthouse tower, original keeper's dwelling, connecting passageway between the dwelling and the tower, and installation of the Fresnel lens, all in 1874; construction of the original privy ca. 1873–1874; and construction of the brick oil house in 1895. It is likely that a boathouse was built between 1875 and 1879; the first indication of a boathouse on the site, however, occurs on a 1887 survey of the site by George Wisner. A barn/shop may have been constructed sometime prior to 1884. Full-time operation of a staffed site began in 1874. It developed as a utilitarian site of both residence and industry. Events and activities, such as storms, fires, the initiation of logging operations, fruit tree plantings, and sidewalk installation, also affected the appearance and operation of the site during this period.

When construction began on the light station in 1873, the area was densely forested with a heavy growth of mixed coniferous and deciduous vegetation. Work crews cleared a small area of land to accommodate construction, but it appears that Au Sable Point remained densely forested through construction of the light station in 1873, and remained so even after construction was completed in 1874 when the site became operational. Apparently, only a small area was cleared initially and clearing the land of undesirable vegetation continued for some time.

Keeping the site clear of vegetation was also a major activity for station personnel during this period. In August 1879, Napoleon Beedon, Principal Keeper of the Light Station for the period 1876 to 1879, wrote terse comments in his daily journal bemoaning his status as an unappreciated employee. He wrote, *"During the time I have been in the employ [sic] of the government I have cleared up many an acher [sic] of land for the government ... that I found in a state of wilderness."*

Little is known about the domestic landscape of the station during this period. No references to gardening have been found, but gardening most certainly could have occurred. Given that all foodstuffs brought to the site came by boat or were carried by travelers on foot or using dog sled, it would have been prudent for the keepers to maintain at least a small garden plot for vegetables. There is documentation, however, of orchard development in the early 1880's. Keeper Frederick W. Boesler made the following entry in the station logbook: *"I the Keeper grafted 24 fruit trees 12 of cherry and 12 of apples the first part of May 1881."* The exact locations of the fruit tree plantings are not known, but it is logical to assume that the fruit trees were planted within the clearing created for the light station.

1896–1959: Industrialization and Technological Improvement

The light station also experienced considerable site development during this time, but remained primarily a wooded site into the early part of the twentieth century. Many features needed for the operation of the station and the comfort and convenience of station personnel were added as the light station developed into a larger complex of buildings and structures.

Graphic documentation available for this period reveals little about the landscape. There are 1904 photographs of both the original keeper's dwelling and the fog signal building, but neither photograph includes much of the surrounding landscape. The 1902 survey, "Sketch of Light-House Site at Au Sable, Mich.," which has been annotated for later periods, only indicates feature locations at the site for 1902. The eight individual buildings are identified as symbolic representations and not by name or footprint. It is likely that the features depicted on the plan are the lighthouse, original keeper's dwelling, the original privy, the woodshed, the fog signal building, the boathouse, and the dock; the final feature may indicate the location of the barn/shop, as discussed for the previous period.

During most years, the station closed in mid-December and opened in mid-April, during the time when Lake Superior was closed to shipping because of ice. The precise schedule varied according to weather conditions on the lake. The following journal entry from December 16, 1899 provides an indication of the schedule, "*We Layed [sic] up the Boiler and Engine in the Fog Signal and Closed down the Light for the Winter.*" The station opened the following spring on April 9, 1900, when the keeper recorded, "*My Self and My Assistant arrived at this Station at 12:20 P.M. there are not much signs of navagation [sic] there are Ice in the Lake as far as one can See.*" In some years, the station opened early, during the month of March.

Several changes during the 1909–1939 period affected the administration and development of the light station. In 1910, the name of the station was changed to Au Sable Light Station as part of the administrative change from the U.S. Lighthouse Service to the Bureau of Lighthouses.

The appearance of the landscape changed in 1909 when station personnel began to replace wooden walkways with concrete ones. The concrete walks gave the station a more regular geometry and gave emphasis to the site layout. The inspection report for that year noted that "A board walk (to be replaced with cement 1909) leads to the wharf." Under the heading 'Paths or walks on the premises,' the report describes "Present walks of plank, from dwelling to all outbuildings, boathouse, fog signal and dock." The 1909 plan gave the concrete walkway dimensions to be 18 inches to 30 inches wide. The concrete walks required regular maintenance. Reports for the remainder of this period consistently mentioned adding and repairing walks. The following selected report entries indicate the importance of internal circulation to this entirely pedestrian site, and the level of attention given to providing and maintaining walks within the light station.

Despite the clearing that occurred during this period, fires continued to be a problem for the station. The policy of Au Sable lighthouse keepers was to sound the whistle in the fog signal building as a warning for ships when smoke from area fires impeded clear vision. The keeper recorded brush fires in the area in log entries for October 8 and 10, 1923, and the crew sounded

the signal for smoke on both days. Approximately ten years later, from September 3-5, 1933, the keeper sounded the fog signal for smoke, probably indicating the presence of fires in the area. Log books also indicate that personnel stationed at Au Sable burned grass clippings and periodically burned the light station grounds to “clean up” the area. It appears that the grass that was kept cut and burned was never a planted, cultivated variety, but instead a combination of native grasses and other low herbaceous plant materials. The best available documentation of the character of that vegetation in the cleared area comes from contemporary photographs.

Records for the 1920’s document some garden planting, tending, and harvesting. No specific produce is mentioned by name except potatoes. It is likely that there were garden plots throughout the history of the site given its rural and isolated location and the self-reliant nature of households during the nineteenth and early twentieth centuries. No documentary evidence for gardens in other periods has been identified, however.

The vehicular age was acknowledged at the station with the construction in 1925 of a garage that was built two miles from the station at an undetermined location. The log entry for July 27, 1925, recorded the event: “*Keeper and 1st asst putting up a small Garage on the hill 2 miles from station.*” The growing acceptance and availability of the automobile and the presence of a garage provided light station staff with more personal freedom than had heretofore been possible, although the garage was built for the temporary storage of a vehicle and supplies. With this addition, keepers and assistants no longer had to walk the entire distance to Grand Marais on their weekly treks for supplies and mail. After 1925, the daily logs record trips made by car rather than by foot. The regular walk to Grand Marais for supplies and mail had finally ended.

A 1940’s aerial photograph gives the best indication of the appearance and layout of the light station during the early part of this period. With the exception of the 1954 frame garage, the station is complete and many cultural landscape features are visible as well as the site’s primary buildings. The dock and the seawall (following its 1942 extension) are evident in the photograph. Both the brick and the metal oil houses are visible in the photograph; to the right of the tower there are two brick privies and at least one of the frame woodsheds south of the dwellings; the dominance of the interconnecting internal walk system is particularly evident. This photograph, more than any other available for the historical periods, indicates the extent of the area cleared of vegetation for the light station.

Lake Superior continued to take its toll on the seawall through this period. By 1942, 85 percent of the retaining seawall had collapsed into the lake. To provide better protection for the fog signal building, the wall was repaired and extended westward another 63 feet in 1942, bringing its total length to 130 feet. The new extension turned off at a slight angle, following the course of the bank line. Despite these efforts, the periodic storms and constant presence of the lake continued to damage the wall. As had been the case since the first efforts to create a seawall in the nineteenth century, Lake Superior was relentless and caused each successive wall to fail.

1959–1967: Abandonment

This period marks the end of dependence on human-operated light stations and of changes influenced by modern technology and modernization. Lake Superior continued to be important

for shipping in this period, particularly for iron ore. During this period, there were annual inspections and the light unit was serviced as needed. The site was virtually abandoned, however, with only USCG checks and the annual site inspections beginning in 1959. After 1958, the site was allowed to revegetate and cultural features were vulnerable because of abandonment and non-use. Changes after this time were largely a function of abandonment and neglect. In 1961, the USCG declared the station site excess property. As a result of abandonment and the loss of regular maintenance, vegetative re-growth began to reclaim the southern portion of the area once kept cleared. Buildings, structures, and other features were left to deteriorate. The hennery was removed sometime during this period.

The Au Sable Light Station was listed in the National Register of Historic Places in 1978 for its historic and architectural significance. The National Register nomination recognizes the significance of the Au Sable Light Station for its use as a navigational aid on the “graveyard coast,” and as “an excellent example” of nineteenth century lighthouse architecture. Additionally, the nomination describes this station as “... the most accessible of the Park Service’s Great Lakes Lighthouses [and] it is also an excellent example of a complete lighthouse complex from oil storage sheds to [the] fog signal building.”

NPS efforts to manage and preserve the site have been focused primarily on protection of the station’s principal buildings and structures. Buildings and structures were stabilized by NPS park maintenance staff under the direction of the Midwest Regional Office. NPS installed a timber seawall in 1976 to aid primarily in protection of the fog signal building. Seawalls had been built throughout the history of the station to protect its shoreline and vulnerable buildings and structures. The double-tiered retaining wall of wooden planks supports the soil under the fog signal building. In 1989, the porch of the assistant keepers duplex/dwelling was restored to its 1909 appearance.

Several landscape changes occurred during the early years of NPS ownership. NPS survey markers were installed in two locations at the station in 1977. In 1988 underground fuel tanks adjacent to the fog signal building and the garage were removed. NPS also developed and introduced a system of site signage, which included wayside exhibits, informational signs, and trail markers for the existing North Country Trail. The telephone line was removed sometime during this period, probably ca. 1980. As a result, there was a re-growth of black spruce in the former telephone right-of-way. The formerly cleared area of the site south of the station’s building cluster also has experienced a successional re-growth of vegetation, which has resulted in some encroachment into the site’s historically cleared area. This re-growth was neither planned nor discouraged since NPS has had no specific policy for vegetative management of the station landscape.

In 1994, the USCG transferred the tower and its 30-foot by 30-foot parcel to NPS. Since that time, NPS has had responsibility for the entire light station. The USCG, however, still maintains a presence at the site with its responsibility for and annual servicing of the automated light unit and associated photovoltaic equipment. As a result of the transfer, NPS began to plan for the restoration of the Fresnel lens to the tower. In August 1996, the Fresnel lens was reinstalled in the tower.

APPENDIX B

Conditions of Permit and Standard Requirements

Conditions

This permit is valid for TWO years from date of issuance. If construction is not commenced within two years, a permit extension may be applied for in writing by identifying the project and permit number. THIS PERMIT IS NONTRANSFERABLE.

This permit does not constitute a guarantee the system will function properly under all conditions. Construction, installation or operation of the sewage disposal system authorized by this permit does not authorize the use or activity for which the disposal system is required. The issuance of this permit is not a representation that any other permit for residential or other use at the same location or on the same parcel will be issued in the future by the authorized Health Department.

By accepting this permit, the applicant acknowledges that other permits may be required for the use or activity to be served by the disposal system and that each permit will be subject to the zoning, building, and related ordinances and development standards in effect at the time the permit is issued or reissued, or proposed to be issued or reissued.

By accepting this permit, the applicant (if other than the owner) certifies that the proposed work is authorized by the owner to accept this permit as his/her authorized agent.

By accepting this permit, the applicant certifies that the physical location of the well, septic system, building(s) and other features indicated on the construction permit application is within the lawful boundaries of the real property described in or attached to this permit.

All well construction will be in accordance with GROUND WATER QUALITY CONTROL (Part 127 - Act 368 P.A. 1978, as amended, and rules) and, for commercial establishments, SAFE DRINKING WATER ACT (Act 399 P.A. 1976 and Administrative Rules.

Abandoned wells must be plugged in accordance with Part 127, Act 368, P.A. 1978.

Standard Requirements

1) Soil/Limiting Conditions

- a) Acceptable Soils: Sands, loamy sands and loams
- b) Minimum natural depth from ground surface to seasonal high water table: varies with soil type -24" in sand to 12" in loams
- c) 48" of soil required between bottom of absorption field and seasonal high water table, slowly permeable soils or bedrock

2) Location

- a) Lot size must accommodate building plans and septic/well requirements
- b) Do not locate in areas subject to surface water flooding or less than 100 year flood plain
- c) Do not locate a drain field under buildings, parking lots or roads; well must be at least 3' from any building/building overhang and protected from vehicular traffic
- d) Locate systems to be accessible for cleaning and inspection

3) Isolation Distances

- a) 75' septic tank/absorption field to surface water
- b) 50' septic tank/absorption field to well (except 100' for privy-well)
- c) 50' absorption field to storm drains or building foundations with footing drains
- d) 20' absorption field to bank or drop-off
- e) 15' absorption field to building foundations without footing drains
- f) 10' septic tank/absorption field to property lines, water lines
- g) 5' septic tank to building foundation and subsoil drains

3) Well

- a) Minimum well depth is 25'
- b) Casing must extend at least 12" above the ground surface
- c) Buried water suction lines between well and pump must be protected by pressurized concentric piping
- d) Abandoned well must be filled with cement or other approved material

A permit to construct the septic leach system has been applied for and approved by the county health office who assures that the design complies with the Michigan Groundwater Quality Control (part 127 - ACT 368 P.A. 1978 as amended, and Safe Drinking Water Act 399 P.A. 1976 and administrative rules. See attached Conditions of Permit and Standard Requirements.

The system is designed to accommodate 300 gpd and utilizes two 1000-gallon septic tanks connected in series to the leach field that has an absorption area of 400 sq/ft

- The field is located more than 200 ft from the Lake Superior shoreline
- The site is located 30" above the lake with 30' of sand to bedrock.
- The water well, which is cased to bedrock, is 270' deep is located 90' from the septic system.
- Underground storage tanks that were removed by the U.S. Coast Guard in the 1980's, of which no leaks or contamination was found, were located 200 feet east of the proposed septic system and 300 feet from the water well.
- Conventional tracked excavator will perform construction, and equipment transported on the light station access road. The proposed system is located 25 feet from the end of the access road turn-around.
- Sandy soil is consistent throughout with sparse vegetation and any damage to vegetation adjacent to the site from equipment and activity will be minimal and nearly unnoticeable.

APPENDIX C

Alternatives Comparison Chart

Alter-native	Tree Removal	Restore Sand Blowouts (wind deflated sandy depressions)	Repair Sidewalks	Rem-Reve
A	No change in management.	No change in management.	No change in management.	No ch
B	Remove trees larger than 6 inches dbh within the historically cleared landscape area (excluding the Lake Superior shore-line beach ridge bank).	<p>Areas of landscape blowouts exposing structural, archeological resources, or erosion control elements would be filled or covered with sand/soil mix. This would include approximately 5,625 square feet of area adjacent to the fog signal building and cistern and 1,875 square feet adjacent to HS-11, including remnants of the former brick patio.</p> <p>An 1,875 square foot area of sand blowout northwest of HS-10 and HS-11 will be filled with adjacent beach sand material to repair visitor-induced erosion.</p> <p>Approximately 18,625 square feet of disturbed or bare sandy soils repaired at former beach ridge blowouts will be revegetated with seeds from local, native vegetation suitable for xeric (dry) sites. Seed would be spread both in the fall of the project year and the following spring.</p> <p>Sand blowouts within this cultural landscape resulted from human recreational activities that include climbing the lakeshore dune face to gain access to the lighthouse. These blowouts will be restored using dispersed sand/soil mix originating from these blowouts presently occur within the cultural landscape.</p>	Exotic plants will be mechanically removed from the light station grounds and surrounding landscape, encompassing approximately 2.5 acres. The work can be accomplished by hand pulling from the sandy soil. The area will be seeded with local, native xeric (dry) species suitable to the site in both the fall of the project year and the following spring. Exotic plants will be monitored and controlled annually.	No sic this alt

C	Remove <u>all</u> woody vegetation within the historically cleared landscape area (excluding the Lake Superior shoreline beach ridge bank face).	<p>Approximately 10,125 square feet of landscape blowout including exposed structural, archeological resources, or erosion control elements would be filled or covered with sand/soil mix as indicated by historic photographs. Areas include (1) northwest of HS-09, (2) entrance to service road near garage, (3) North Country Trail corridor through the reservation, and (4) approach to Fog Signal building from lake. Fill for these areas will be obtained from high wind-blown beach ridge areas adjacent to the low areas. Landscape prescriptions will approximate scene in historic photographs.</p> <p>Approximately 18,625 square feet of disturbed or bare sandy soils repaired at former beach ridge blowouts will be revegetated with seeds from local, native vegetation suitable for xeric (dry) sites. Seed would be spread mechanically both in the fall of the project year and the following spring.</p> <p>Sand blowout within this cultural landscape resulted from human recreational activities including climbing the lakeshore dune face to gain access to the lighthouse. These blowouts will be restored using dispersed sand/soil mix originating from these blowouts that presently occur within the cultural landscape.</p>	Exotic plants will be mechanically removed from the light station grounds and surrounding landscape, encompassing approximately 2.5 acres. The work can be accomplished through hand pulling from the sandy soil. The area will be seeded with local, native xeric (dry) species suitable to the site in both the fall of the project year and the following spring. Exotic plants will be monitored and controlled annually.	Reconstruction of the light station grounds and surrounding landscape, encompassing approximately 2.5 acres. The work can be accomplished through hand pulling from the sandy soil. The area will be seeded with local, native xeric (dry) species suitable to the site in both the fall of the project year and the following spring. Exotic plants will be monitored and controlled annually.
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Alternative Impacts Comparison

Alter-native	Air Quality	Groundwater Hydrology	Vegetation	Wildlife	Cultural Resources	Recreational Experiences
A (No Action)	No impacts to air quality	No impacts to groundwater hydrology	Alternative A would allow natural succession of woody vegetation to occur. In addition, Alternative A would allow continuation of non-native plant populations to persist.	Alternative A would have a minor long-term adverse effect on wildlife resulting from non-native plants altering habitat that would otherwise be occupied by native species.	Alternative A will have a major long-term negative impact on the site's cultural resources. As vegetation continues to grow within the historically cleared area (for fire protection, site maintenance and other reasons), the historic scene will be increasingly impaired as an historically open area fills in with trees and shrubs. Remnants of the former brick patio will sustain major long-term negative impacts as they will remain visible creating tripping hazards and susceptible to looting disturbance by visitors.	Alternative A would have recreational experiences that are not impacted by the project.
B	Air quality would be adversely affected for a short period via dust put into the area due to alterations of the landscape via earth-moving equipment.	Groundwater hydrology would be subject to negligible or minor long-term adverse effects due to construction of a low volume septic field and/or well. As septic and well standards need to meet Michigan Department of	Alternative B would result in removal of some native naturally regenerating small trees and shrubs. Alternative B would also result in removal of non-native vegetation species at the site. Removal of non-	Alternative B would have minor long-term positive effects on wildlife. With respect to bald eagles, restoration would occur outside the critical nesting	Alternative B will have a moderate short-term impact on the cultural resources of the site in that the historic scene will be manipulated as it is being rehabilitated to its early 1900's appearance. Sidewalk reconstruction will result in moderate long-term impacts as they are leveled and realigned	Alternative B would have recreational experiences that are not impacted by the project.

		Environmental Quality, only negligible long-term adverse effects should occur	native vegetation will reduce its overall presence in the lakeshore and reduce potential for additional colonization.	period and is anticipated to begin in early September.	to provide for public safety. Remnants of the former brick patio will sustain major long-term positive impacts as they will be covered to reduce tripping hazards and looting disturbance by visitors.	
C (Preferred Alternative)	Air quality would be adversely affected for a short period via dust put into the area due to alterations of the landscape via earth-moving equipment.	Groundwater hydrology would be subject to negligible or minor long-term adverse effects due to construction of a low volume septic field and/or well. As septic and well standards need to meet Michigan Department of Environmental Quality standards, only negligible long-term adverse effects should occur.	Alternative C would result in removal of some native naturally regenerating small trees and shrubs. Alternatives C would also result in removal of non-native vegetation species at the site. Removal of non-native vegetation will reduce its overall presence in the lakeshore and reduce potential for additional colonization.	Alternative C would have minor long-term positive effects on wildlife. With respect to bald eagles, restoration would occur outside the critical nesting period and is anticipated to begin in early September.	Alternative C will have a moderate short term impact on the cultural resources of the site in that the historic scene will be manipulated as it is being rehabilitated to its early 1900's appearance. Sidewalk reconstruction will result in moderate long-term impacts as they are leveled and realigned to provide for public safety. Remnants of the former brick patio will sustain major long-term positive impacts as they will be covered to reduce tripping hazards and looting disturbance by visitors.	Alterations to the landscape would result in moderate short-term impacts on the cultural resources of the site in that the historic scene will be manipulated as it is being rehabilitated to its early 1900's appearance. Sidewalk reconstruction will result in moderate long-term impacts as they are leveled and realigned to provide for public safety. Remnants of the former brick patio will sustain major long-term positive impacts as they will be covered to reduce tripping hazards and looting disturbance by visitors.